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ABSTRACT:

PURPOSE: To ultrasonically weld a flat conductor to another conductor while an insulating film layer is provided on an unwelded face.

CONSTITUTION: Flat conductors 11, 21 are pinched by the horn P of a ultrasonic welding machine W and an anvil A while the flat conductor 11 exposed on the face opposite to the face provided with an insulating film layer 12 is kept in contact with the flat conductor 21 exposed on the face opposite to the face formed with an insulating film layer 22. Projections P1, A1 provided on pressure faces of the horn P and the anvil A bite into the insulating film layers 12, 22 into contact with the flat conductors 11, 21,

the horn P is
vibrated, and the flat conductor 11 and the flat conductor
21 are welded. The
troublesome work to provide the insulating films 12, 22 on
the flat conductors
11, 21 is not required.

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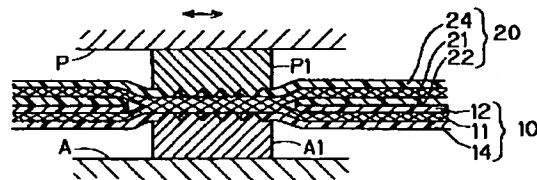
(54)【発明の名称】 フラット導体の接続方法

(57)【要約】

【目的】 フラット導体を、非溶接面に絶縁被覆層を設けた状態で他の導体と超音波溶接できるようにすることにある。

【構成】 前記絶縁被覆層12を設けた面と反対側の面において露出したフラット導体11に、前記絶縁被覆層22を形成した面と反対側の面において露出したフラット導体21を接触させた状態で、これらフラット導体11、21を超音波溶接機WのホーンPとアンビルAにより挟持し、前記ホーンPおよびアンビルAの加圧面に設けた突起P1、A1を前記絶縁被覆層12、22に食い込ませて前記フラット導体11、21に接触させ、この状態で前記ホーンPを振動させて前記フラット導体11とフラット導体21を溶接する。

【効果】 溶接後にフラット導体に絶縁被覆層を設けるという煩雑な作業を行う必要がなくなるという効果を有する。



【特許請求の範囲】

【請求項1】 少なくとも一方の面に絶縁被覆層を設けたフラット導体を、前記絶縁被覆層を設けた面と反対側の面である接続面側において他の導体に接続する方法であって、

前記絶縁被覆層形成面の反対側の面において露出したフラット導体と他の導体を対向させた状態で、これらフラット導体と他の導体を超音波溶接機のホーンとアンビルの間に配置する第1の工程と、

ホーンとアンビルの間に前記フラット導体と他の導体を挟持することにより、前記ホーンまたはアンビルの加圧面に設けた突起を前記絶縁被覆層に食い込ませて前記フラット導体に接触させる第2の工程と、

前記ホーンを振動させて前記フラット導体に他の導体を溶接する第3の工程と、を含むことを特徴とするフラット導体の接続方法。

【請求項2】 少なくとも一方の面に絶縁被覆層を設けたフラット導体を、前記絶縁被覆層を設けた面と反対側の面である接続面側において他の導体に接続する方法であって、

前記接続面において露出したフラット導体と他の導体を対向させた状態で、超音波溶接機のホーンとアンビルの間に、前記絶縁被覆層を介して前記フラット導体と他の導体を挟持する第1の工程と、

前記第1の工程において前記フラット導体と他の導体を挟持しているホーンを、前記フラット導体の面方向と交差する方向に振動させることによって、前記絶縁被覆層における前記ホーンまたはアンビルとの接触部分を除去する第2の工程と、

超音波溶接機のホーンとアンビルの間に、前記ホーンまたはアンビルが前記絶縁被覆層の除去部分において前記フラット導体に接触した状態で、前記フラット導体と他の導体を挟持する第3の工程と、

前記第3の工程において前記フラット導体と他の導体を挟持しているホーンを、前記フラット導体の面方向に振動させることによって、前記フラット導体に他の導体を溶接する第4の工程と、を含むことを特徴とするフラット導体の接続方法。

【請求項3】 請求項2のフラット導体の接続方法において、

前記第1および第2の工程において前記絶縁被覆層を介してフラット導体と他の導体を挟持するホーンとアンビルが、第3および第4の工程において直接前記フラット導体と他の導体を溶接するホーンとアンビルを兼ねることを特徴とするフラット導体の接続方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、自動車内配線や電気機器内の配線に用いられるフラット導体を他の導体に接続する方法に関する。

【0002】

【従来の技術】複数の並列するフラット導体の両面あるいは片面に絶縁被覆層を設けてなる、いわゆるフレキシブルプリント回路と呼ばれるフラットケーブルは、多数の配線を少ないスペースに収めることができるため、近時、自動車内や電気機器内の配線にしばしば用いられるようになっている。

【0003】上記のようなフラットケーブルのフラット導体を他のフラット導体や通常の電線に接続する場合、従来においては、各フラット導体の端末部に個別に端子を接続するか、あるいはフラットケーブルの端末部の絶縁被覆層を除去したのち、この端末部にコネクタを装着し、前記端子もしくはコネクタを介して、前記フラット導体に他の導体を接続するようにしていた。

【0004】しかしながら、上記のような端子やコネクタはフラットケーブルに比べかなり大きな厚みおよび幅を有しているのが一般的であるため、このような端子やコネクタを用いると、接続部に大きなスペースを必要とし、省スペースという、フラットケーブルを用いることによる利点を十分に生かすことができないという問題がある。

【0005】このため、近時、特開昭62-105308号公報に開示されるように、2以上のフラット導体を超音波溶接により直接接続することで、この接続部が占めるスペースを小さくすることが提案されている。ここに開示されるフラット導体の接続方法は、超音波溶接によりフラット導体を接続するため、接続時には、前記フラット導体における接続面と反対側の面、すなわち超音波溶接機のホーンもしくはアンビルが接触する面に絶縁被覆層を設けず、接続が終わってから絶縁被覆層となる絶縁材をフラット導体に貼り付けるようにしている。

【0006】

【発明が解決しようとする課題】しかしながら、上記従来公報に開示されるフラット導体の接続方法は、超音波溶接による接続が終わってから絶縁被覆層を設けるものであるため、フラット導体と絶縁被覆層の位置合わせというきわめて煩雑な作業を行わなければならない、作業効率が低くなるという問題があった。

【0007】こうした問題を解決するために、接続前にフラット導体に絶縁被覆層を設けておき、超音波溶接機のホーンもしくはアンビルが接触する箇所の絶縁被覆層のみをあらかじめ除去しておくことが考えられる。しかしながら、こうした方法では、絶縁被覆層の除去箇所とホーンもしくはアンビルを位置合わせすることが難しく、実用に即しないという問題がある。

【0008】発明は上記のような事情に鑑みなされたものであって、少なくとも一方の面に絶縁被覆層を設けたフラット導体を、前記絶縁被覆層を設けた面と反対側の面である接続面側で他の導体に容易に接続することができ、

いる。

【0009】

【課題を解決するための手段】上記目的を達成する請求項1のフラット導体の接続方法は、前記絶縁被覆層形成面の反対側の面において露出したフラット導体と他の導体を対向させた状態で、これらフラット導体と他の導体を超音波溶接機のホーンとアンビルの間に配置する第1の工程と、ホーンとアンビルの間に前記フラット導体と他の導体を挟持することにより、前記ホーンまたはアンビルの加圧面に設けた突起を前記絶縁被覆層に食い込ませ、前記フラット導体に接触させる第2の工程と、前記ホーンを振動させて前記フラット導体に他の導体を溶接する第3の工程とを含むことを特徴としている。

【0010】また、請求項2のフラット導体の接続方法は、前記接続面において露出したフラット導体と他の導体を対向させた状態で、超音波溶接機のホーンとアンビルの間に、前記絶縁被覆層を介して前記フラット導体と他の導体を挟持する第1の工程と、前記第1の工程において前記フラット導体と他の導体を挟持しているホーンを、前記フラット導体の面方向と交差する方向に振動させることによって、前記絶縁被覆層における前記ホーンまたはアンビルとの接触部分を除去する第2の工程と、超音波溶接機のホーンとアンビルの間に、前記ホーンまたはアンビルが前記絶縁被覆層の除去部分において前記フラット導体に接触した状態で、前記フラット導体と他の導体を挟持する第3の工程と、前記第3の工程において前記フラット導体と他の導体を挟持しているホーンを、前記フラット導体の面方向に振動させることによって、前記フラット導体に他の導体を溶接する第4の工程とを含むことを特徴としている。

【0011】請求項3のフラット導体の接続方法は、請求項2において、前記第1および第2の工程において前記絶縁被覆層を介してフラット導体と他の導体を挟持するホーンとアンビルが、第3および第4の工程において直接前記フラット導体と他の導体を溶接するホーンとアンビルを兼ねることを特徴としている。

【0012】

【作用】請求項1のフラット導体の接続方法では、フラット導体にあらかじめ絶縁被覆層が設けられている場合でも、ホーンまたはアンビルの加圧面に設けた突起が前記絶縁被覆層に食い込むことによって、直接ホーンとアンビルの間にフラット導体とこのフラット導体に接続する他の導体とを挟持することができる。したがって、この状態でホーンを振動させることにより、前記フラット導体と他の導体を接続することができる。

【0013】請求項2のフラット導体の接続方法では、フラット導体にあらかじめ絶縁被覆層が設けられている場合でも、ホーンとアンビルの間に前記絶縁被覆層を介して前記フラット導体と他の導体を挟持した状態で、前記ホーンを前記フラット導体の面方向と交差する方向に

振動させることによって前記絶縁被覆層を除去することができる。したがって、次にホーンとアンビルの間に直接フラット導体と他の導体を挟持し、ホーンを前記フラット導体の面方向に振動させることによって前記フラット導体と他の導体を溶接することができる。

【0014】請求項3のフラット導体の接続方法では、絶縁被覆層を介して前記フラット導体と他の導体を挟持したホーンとアンビルを、その挟持状態を維持したまま、フラット導体と他の導体を溶接するホーンとアンビルとして用いることができる。

【0015】

【実施例】図1～図5は、2枚のフラットケーブル10、20のフラット導体11、21を接続する場合の、発明によるフラット導体の接続方法を示している。

【0016】まず、フラットケーブル10、20のフラット導体11、21を接続する超音波溶接機Wを、図6および図7を参照しながら説明する。図6に示す超音波溶接機WのホーンPとアンビルAには、それぞれ三角形の頂点に位置する3個の円柱状加圧部P1、A1（図6では、加圧部P1は不図示）が設けられている。ホーンPの各加圧部P1は、それぞれアンビルAの各加圧部A1に対向して設けられている。また、各円柱状加圧部P1、A1の加圧面には、図7に示すように、格子状に設けられた多数の突起P11またはA11が形成されている。この超音波溶接機Wは、ホーンPを水平方向に振動させる振動子を備えるものである。

【0017】次に、図8および図9を参照しながらフラットケーブル10、20について説明する。

【0018】図8に示すように、フラットケーブル10は、並列に配設された複数の帯状フラット導体11を備えている。前記フラット導体11は銅箔等の金属箔である回路導体であって、エッチングあるいはプレス加工等の適宜手段により形成されたものである。前記フラット導体11の一方の面には、ポリエステルやポリイミド等である絶縁フィルム12が接着剤等を用いて貼り合わされている。この絶縁フィルム12には複数の円形穿孔13が形成されており、これらの穿孔13を介して前記フラット導体11が露出している。穿孔13は、前記超音波溶接機Wの円柱状加圧部P1、A1の加圧面よりも大きな面積を有している。一方、前記フラット導体11の他方の面には、前記絶縁フィルム12と同じ材質である絶縁フィルム14が接着剤等を用いて貼り合わされている。この絶縁フィルム14は、前記フラット導体11の他方の面を全域に亘って被覆している。

【0019】フラットケーブル20も前記フラットケーブル10と同様、フラット導体21の一方の面に穿孔23が形成された絶縁フィルム22が貼り付けられるとともに、前記フラット導体21の他方の面に、この他方の面を全域に亘って被覆する絶縁フィルム24が貼り付けられている。前記絶縁フィルム22に形成された各穿孔

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23は、図9に示すように、このフラットケーブル20と前記フラットケーブル10を直交状態で対峙させたとき、フラットケーブル10の各穿孔13と1対1で対向する位置に設けられている。

【0020】前記フラットケーブル10のフラット導体11とフラットケーブル20のフラット導体21を接続するにあたっては、まず前記アンビルAの加圧部A1の上に前記フラットケーブル10とフラットケーブル20を載置する。このとき、図1に示すように、フラットケーブル10の絶縁フィルム12に形成した穿孔13とフラットケーブル20の絶縁フィルム22に形成した穿孔23とが、前記アンビルAの加圧部A1に対応する位置で対向するように配置する。

【0021】次に、図2に示すように、ホーンPを下降させ、このホーンPの加圧部P1と前記アンビルAの加圧部A1の間に前記フラットケーブル10、20を挟持する。

【0022】図2の状態からさらにホーンPを下降させることにより、図3に示すように、アンビルAの加圧部A1に形成した突起A11がフラットケーブル10の絶縁フィルム14に食い込んでフラット導体11に接触し、ホーンPの加圧部P1の加圧面に形成された突起P11がフラットケーブル20の絶縁フィルム24に食い込んでフラット導体21に接触する。また、フラット導体11とフラット導体21が穿孔13および穿孔23に侵入し、互いに接触する。

【0023】この図3の状態で、超音波溶接機WのホーンPを振動させることにより、図4に示すように、フラット導体11とフラット導体21が超音波溶接される。

【0024】上記のようにしてフラット導体11とフラット導体21を超音波溶接した後、これらフラット導体11、21を前記超音波溶接機Wから取り外す。このとき、絶縁フィルム14、24には、前記突起A11、P11の食い込み跡15、25が形成されている。したがって、食い込み跡15、25を被覆するために、図5に示すように、前記絶縁フィルム14、24上に絶縁テープ16、26を貼り付ける。この絶縁テープ16、26の貼り付け作業は、絶縁テープ16、26が、前記孔15、25を被覆するように貼り付けられればよいものである。従来行っていたような溶接作業後のフラット導体11、21の上への絶縁フィルム14、24の貼り付け作業に比べ遥かに簡易であり、それほど作業効率を低下させるものではない。

【0025】以上のようにすることで、一方の面に絶縁フィルム12を設けたフラット導体11と一方の面に絶縁フィルム22を設けたフラット導体22を、超音波溶接機Wを用いて溶接することができる。

【0026】図6に示すような超音波溶接機Wを用いて行う上記のようなフラット導体の接続方法は、3以上のフラットケーブルの各フラット導体を接続する場合にも

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採用することができる。すなわち、図10に示すように、前記フラットケーブル110、120の間にフラットケーブル130を介設した状態で、フラットケーブル110のフラット導体111、フラットケーブル130のフラット導体131およびフラットケーブル120のフラット導体121を接続すべくこれらを溶接することができる。この場合、フラットケーブル110、120は前記フラットケーブル10、20とほぼ同様のものである。すなわち、フラット導体111、121の一方の面に設けた絶縁フィルム112、122にのみ穿孔113もしくは123が形成されており、フラット導体111、121の他方の面に設けた絶縁フィルム114、124はこの他方の面全体を被覆している。また、フラットケーブル130には、フラットケーブル131の両側の面に設けられた絶縁フィルム132、134のそれぞれに、前記フラット導体131を露出させる穿孔133、135が形成されている。

【0027】上記のようなフラットケーブル110、120、130のフラット導体111、121、131は、図11に示すように、ホーンPに与えられた加圧力によりこのホーンPとアンビルAの間でフラット導体111、121、131を接触させるとともに、加圧部P1、A1の加圧面に形成した突起P11、A11を絶縁フィルム114、124にそれぞれ食い込ませてフラット導体111、121に接触させ、次いでホーンPを振動させることにより、超音波溶接することができる。

【0028】また、上記のフラットケーブルの接続方法は、図12に示すようなフラットケーブル210のフラット導体211とフラットケーブル220のフラット導体221の接続にも適用できる。

【0029】フラットケーブル210は、フラット導体211の両面に絶縁フィルム212、214を設けたもので、一方の面の絶縁フィルム212はこのフラットケーブル210の先端部において所定長さ切り欠かれており、この切欠部213においてフラット導体211が露出している。また、フラットケーブル220は、フラット導体221の両面に絶縁フィルム222、224を設けたもので、一方の面の絶縁フィルム222がこのフラットケーブル220の先端部において所定長さ切り欠かれており、この切欠部223においてフラット導体221が露出している。

【0030】上記のようなフラットケーブル210、220を超音波溶接する場合には、図13に示すように、絶縁フィルム212の切欠部213と絶縁フィルム222の切欠部223を対向させた状態でこれらフラットケーブル210、220を前記ホーンPとアンビルAの間に配置する。次いで、図14に示すように、ホーンPとアンビルAの間で前記フラットケーブル210、220に圧力を加える。これによって、加圧部P1の突起P11が絶縁フィルム224に食い込んでフラット導体22

1に接触するとともに、加圧部A1の突起A11が絶縁フィルム214に食い込んフラット導体211に接触する。したがって、この状態でホーンPを振動させることにより、フラット導体211とフラット導体221を溶接することができる。

【0031】上記のようなフラット導体の接続方法は、図15および図16に示すように、フラットケーブル10のフラット導体11もしくはフラットケーブル210のフラット導体211に電線Eの導体E1を溶接する場合にも採用することができる。

【0032】図15および図16のようにフラット導体11、211に導体E1を接続する場合の手順を、フラット導体11に導体E1を接続する場合の1工程を示す図17を参照しながら説明する。

【0033】まず、加圧部A1に切欠部13を対応させた状態でアンビルAの上にフラットケーブル10を載置し、このフラットケーブル10の前記切欠部13に導体E1を接触させるように電線Eを配置する。次いで、ホーンP'を下降させ、このホーンP'とアンビルAの間に挟持したフラットケーブル10と導体E1に圧力を加える。これによって、アンビルAの加圧部A1の加圧面に形成された突起A11がフラットケーブル10の絶縁フィルム14に食い込み、フラット導体11に接触する。したがって、この状態でホーンPを振動させることにより、フラット導体11と導体E1を超音波溶接することができる。このようにして、フラットケーブル10のフラット導体11等に電線Eの導体E1を溶接する場合、ホーンP'の加圧部P'1の加圧面には突起が形成されていなくてもよい。

【0034】図15および図16に示すように、フラット導体11等に導体E1を接続する場合、既述のように、アンビル側にフラット導体11を配置し、ホーン側に電線Eを配置する方が作業上好ましいが、ホーン側にフラット導体211等を配置し、アンビル側に電線Eを配置するようにしても差支えない。

【0035】図18～図22は、前記フラットケーブル10、20のフラット導体11、21を接続する、他のフラット導体の接続方法を示している。

【0036】ここに示すフラット導体の接続方法も、図6に示す超音波溶接機Wとほぼ同様の超音波溶接機W'を用いて行う。この超音波溶接機W'の外観は前記超音波溶接機Wの外観にほぼ等しい。但し、ここで用いる超音波溶接機W'は、ホーンP''を垂直方向に振動させる第1の振動子とホーンP''を水平方向に振動させる第2の振動子を備えている。また、ホーンP''の加圧部P1''の加圧面およびアンビルA''の加圧部A1''の加圧面はともに平坦であり、図6に示す超音波溶接機Wのような突起P11、A11を備えていない。

【0037】以上のような超音波溶接機W'を用いて前記フラットケーブル10、20のフラット導体11、2

1を接続する際においても、まず図18に示すように、穿孔13と穿孔23を対向させ且つこれら穿孔13、23をホーンP''の加圧部P1''とアンビルA''の加圧部A1''を対応させた状態で、前記アンビルA''の加圧部A1''の上に前記フラットケーブル10とフラットケーブル20を載置する。

【0038】次に、前記ホーンP''を下降させることによって、図19に示すように、加圧部P1''、A1''によってフラットケーブル10、20に圧力を加え、フラット導体11、21を接触させる。

【0039】次に、図19の状態ではホーンP''を垂直方向、すなわちフラットケーブル10、20の面方向と交差する方向に振動させる。これによって、図20に示すように、前記加圧部P1''、A1''に接触している絶縁フィルム12、22が除去されて穿孔15、25が開く。また、前記加圧部P1''、A1''の各加圧面がそれぞれフラット導体11、21に接触する。

【0040】したがって、この状態で前記超音波溶接機W'のホーンP''を水平方向に振動させることにより、図21に示すように、フラット導体11、21を超音波溶接することができる。

【0041】最後に、図22に示すように、前記加圧部P1''、A1''の接触部に開口した前記穿孔15、25を被蔽するべく、前記絶縁フィルム12、22上に絶縁テープ16、26を貼り付ける。

【0042】以上のように、図18～図22に示すフラット導体の接続方法によっても、フラット導体11あるいはフラット導体21の一方の面（溶接面と反対側の面）に絶縁フィルム14、24を設けた状態で、これらフラット導体11、21を、超音波溶接機W'を用いて溶接することができる。

【0043】なお、上記図18～図22に示す実施例では、ホーンP''を垂直方向に振動させる振動子と水平方向に振動させる振動子を備える超音波溶接機W'を用いて行う場合を示したが、ホーンを垂直方向に振動させる振動子を備える超音波溶接機を用いて図18～図20の工程を実行し、次いで、ホーンを水平方向に振動させる振動子を備える超音波溶接機により図21～図22の工程を実行するようにしてもよい。

【0044】また、上記図18～図22に示すフラット導体の接続方法は、図23に示すように、ホーンP''の下方に位置するアンビルAA''と前記ホーンP''の側方に位置するアンビルAB''を有し且つどちらか一方方向にのみホーンP''を振動させる一つの振動子を有する超音波溶接機を用いて行っても良い。たとえばホーンP''を水平方向に振動させる振動子を有する場合、まずホーンP''とアンビルAB''の間にフラットケーブル10、20を挟持した状態でホーンP''を振動させることにより絶縁フィルム12、22を除去し、次いで、ホーンP''とアンビルAA''の間に、接触させたフラット導体1

1, 21を挟持した状態でホーンP[〃]を振動させることにより、前記フラット導体11, 21を超音波溶接させるようにしてもよい。

【0045】さらに、上記図18～図22に示すフラット導体の接続方法は、前記図1～図5に示すフラット導体の接続方法と同様、図10に示すような3以上のフラットケーブル110, 120, 130のフラット導体111, 121, 131を接続する場合にも適用できる。また、図12に示すように、一方の面の絶縁フィルム212の先端部を切り欠いて露出させたフラット導体211と一方の面の絶縁フィルム222の先端部を切り欠いて露出させたフラット導体221とを接続する場合にも適用できる。さらに、図15あるいは図16に示すように、フラット導体211と電線Eの導体E1を接続する場合にも適用することができる。

【0046】なお、前記図1～図5を参照して説明したフラット導体の接続方法および図18～図22を参照して説明したフラット導体の接続方法は、いずれも図8あるいは図12に示すように、フラット導体11, 211の両面に絶縁フィルム12, 14もしくは212, 214を設け、一方の面の絶縁フィルム12, 212の一部を除去することにより露出させたフラット導体11, 211に他の導体を溶接するようにしている。しかしながら、上記各方法の対象となるフラット導体は、たとえば図24に示すフラットケーブル310のフラット導体311のように、非溶接面である一方の面側にのみ絶縁フィルム312を設け、溶接面となる他方の面には絶縁フィルムを設けていないフラット導体であってもよい。

【0047】

【発明の効果】請求項1および請求項2によると、フラット導体の非溶接面となる一方の面に絶縁被覆層を設けた状態で、フラット導体と他の導体の溶接を超音波溶接機を用いて行うことができる。したがって、溶接作業において、位置合わせの困難な絶縁被覆層の貼り付け作業を行う必要がなく、溶接作業の効率を向上させることができるという効果を奏する。

【0048】請求項3によると、絶縁被覆層を除去してフラット導体を露出させる工程とフラット導体と他の導体を超音波溶接する工程との間にフラット導体と他の導体の位置を代える工程を必要とせず、したがって作業効率がより向上する。

【図面の簡単な説明】

【図1】発明によるフラット導体の接続方法において、ホーンとアンビルの間に2つのフラット導体を配置した状態を示す説明図である。

【図2】同じく、ホーンとアンビルによって2つのフラット導体を挟持した状態を示す説明図である。

【図3】同じく、各フラット導体の非溶接面側の絶縁フィルムに突起が食い込んだ状態を示す説明図である。

【図4】同じく、各フラット導体が溶接された状態を示

す説明図である。

【図5】同じく、各フラット導体の非溶接面側の絶縁フィルム上に絶縁テープが貼り付けられた状態を示す説明図である。

【図6】超音波溶接機の概略構成図である。

【図7】ホーンおよびアンビルの加圧部を示す図である。

【図8】フラット導体を示す斜視説明図である。

【図9】発明の方法によって溶接される2つのフラット導体の位置関係を示す説明図である。

【図10】発明の方法によって溶接される3つのフラット導体の位置関係を示す説明図である。

【図11】図10に示す3つのフラット導体が溶接された状態を示す断面説明図である。

【図12】発明の方法によって溶接される他の2つのフラット導体を示す説明図である。

【図13】図12に示す2つのフラット導体をホーンとアンビルの間に配置した状態を示す説明図である。

【図14】図12に示す2つのフラット導体をホーンとアンビルによって挟圧した状態を示す説明図である。

【図15】発明の方法によって電線の導体と溶接されるフラット導体を示す斜視説明図である。

【図16】発明の方法によって電線の導体と溶接される他のフラット導体を示す斜視説明図である。

【図17】フラット導体を電線の導体に接続する場合の1工程を示す説明図である。

【図18】他の発明によるフラット導体の接続方法において、ホーンとアンビルの間に2つのフラット導体を配置した状態を示す説明図である。

【図19】同じく、ホーンとアンビルによって2つのフラット導体を挟持した状態を示す説明図である。

【図20】同じく、ホーンを垂直方向に振動させることにより、各フラット導体の非溶接面側の絶縁フィルムを除去した状態を示す説明図である。

【図21】同じく、ホーンを水平方向に振動させることにより、2つのフラット導体を溶接した状態を示す説明図である。

【図22】各フラット導体の非溶接面側の絶縁フィルム上に絶縁テープが貼り付けられた状態を示す説明図である。

【図23】他の発明を実施する超音波溶接機の変形例を示す概略構成図である。

【図24】フラット導体の変形例を示す斜視図である。

【符号の説明】

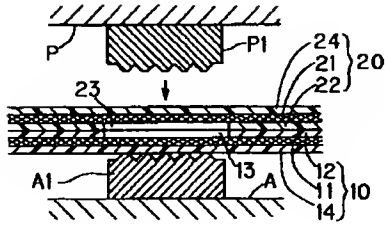
11, 111, 211	フラット導体
12, 112, 212	絶縁フィルム
21, 122, 222	フラット導体
22, 122, 222	絶縁フィルム
E1	導体（他の導体）
W, W [〃]	超音波溶接機

11
P, P', P'' ホーン
A, A', A'', AA'', AB'' アンビル

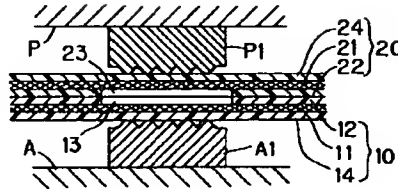
P1, A1

12
突起

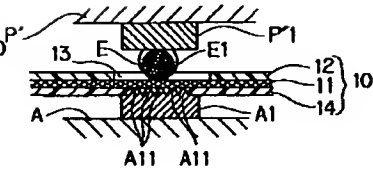
【図1】



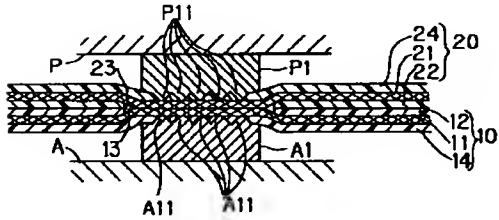
【図2】



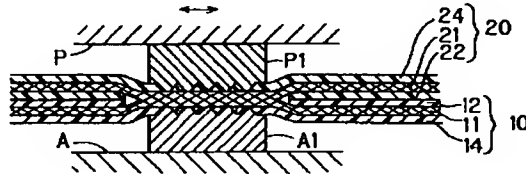
【図17】



【図3】

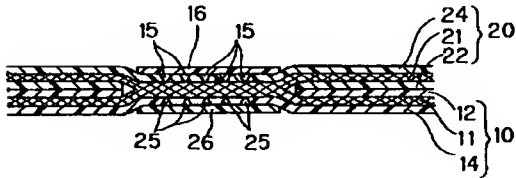


【図4】



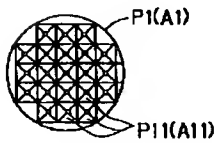
【図6】

【図5】

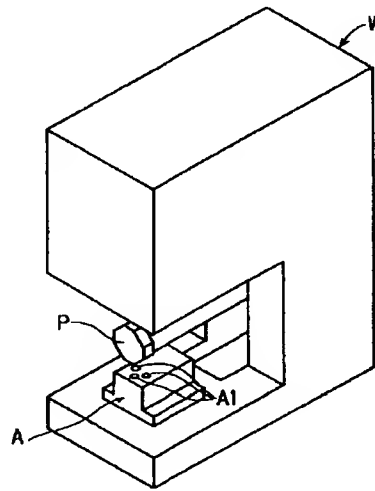
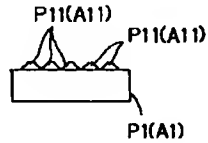


【図7】

(a)

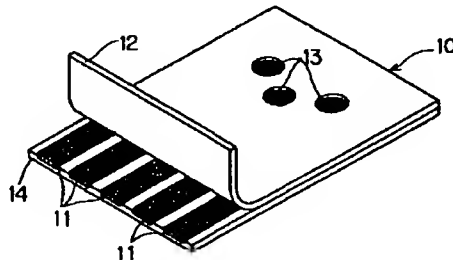
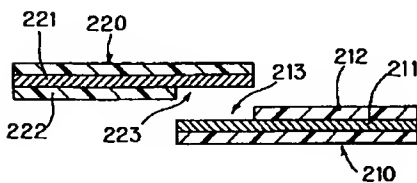


(b)

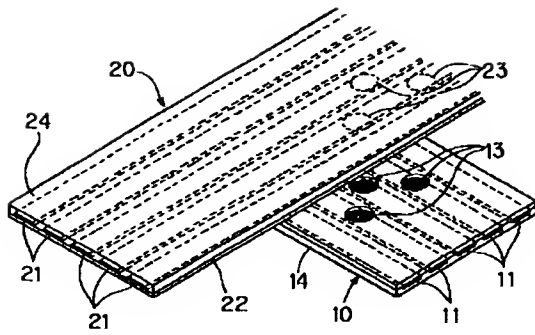


【図8】

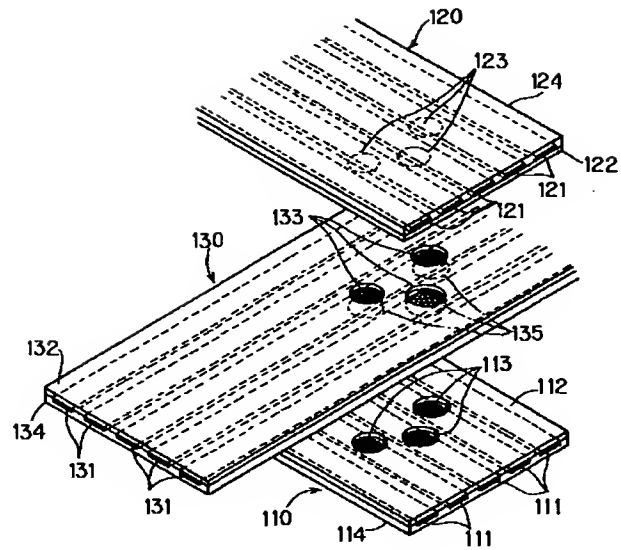
【図13】



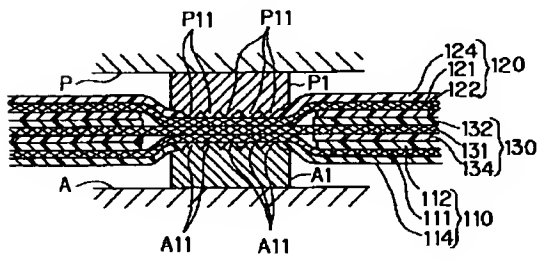
【図9】



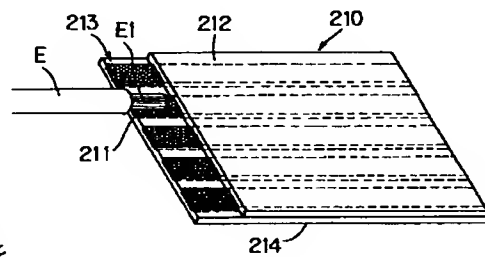
【図10】



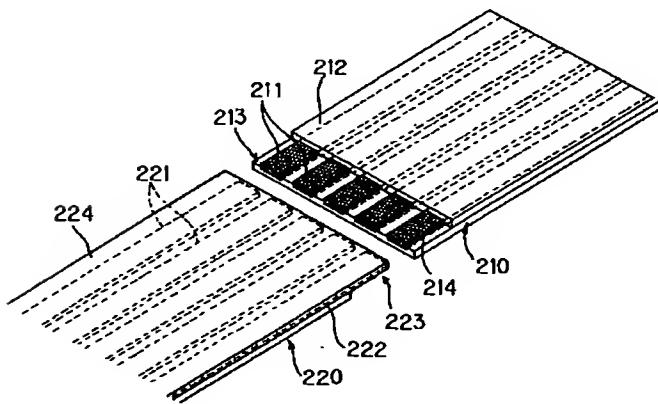
【図11】



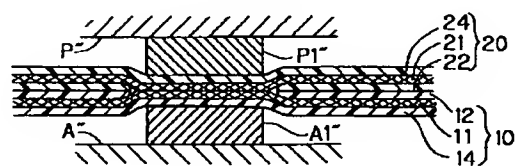
【図16】



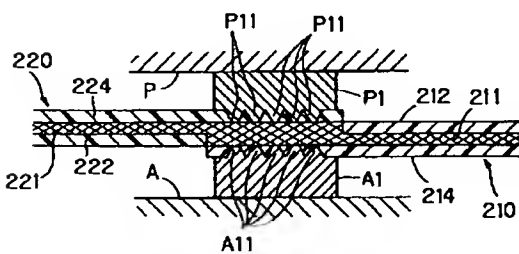
【図12】



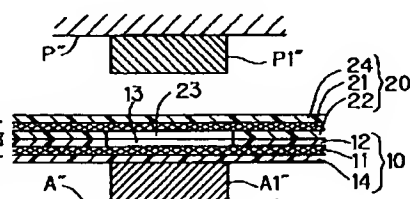
【図19】



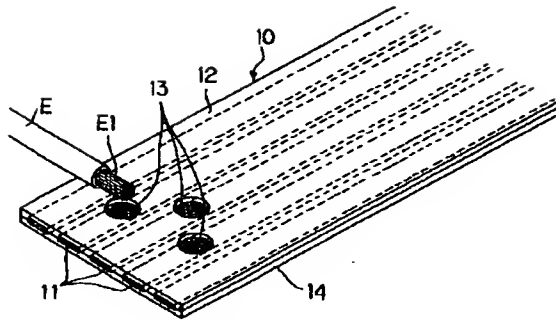
【図14】



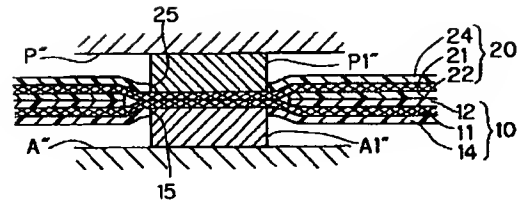
【図18】



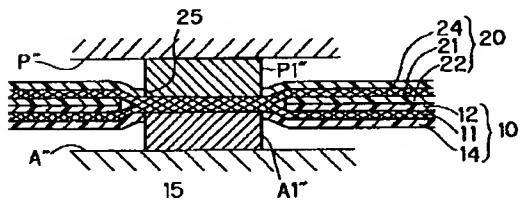
【図15】



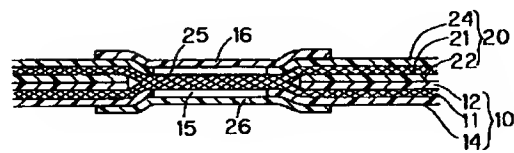
【図20】



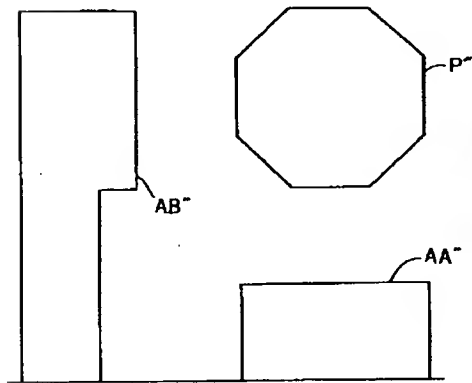
【図21】



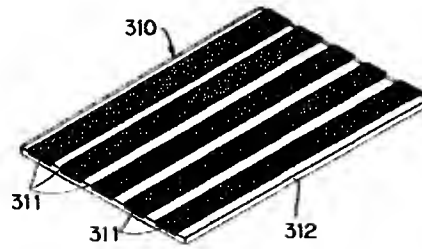
【図22】



【図23】



【図24】



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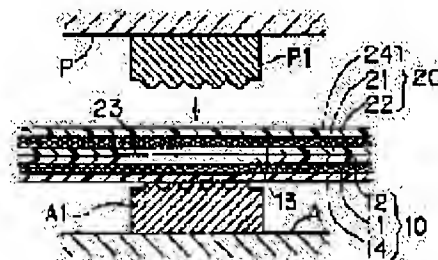
(72)Inventor : INOUE TAKUYA
NORO YUTAKA

(54) CONNECTING METHOD FOR FLAT CONDUCTOR

(57)Abstract:

PURPOSE: To ultrasonically weld a flat conductor to another conductor while an insulating film layer is provided on an unwelded face.

CONSTITUTION: Flat conductors 11, 21 are pinched by the horn P of a ultrasonic welding machine W and an anvil A while the flat conductor 11 exposed on the face opposite to the face provided with an insulating film layer 12 is kept in contact with the flat conductor 21 exposed on the face opposite to the face formed with an insulating film layer 22. Projections P1, A1 provided on pressure faces of the horn P and the anvil A bite into the insulating film layers 12, 22 into contact with the flat conductors 11, 21, the horn P is vibrated, and the flat conductor 11 and the flat conductor 21 are welded. The troublesome work to provide the insulating films 12, 22 on the flat conductors 11, 21 is not required.



LEGAL STATUS

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decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] the flat which prepared the pre-insulation layer in one [at least] field characterized by providing the following -- the method of connecting a conductor to other conductors at the connection side side which is the field and the field of an opposite side in which the aforementioned pre-insulation layer was prepared the flat exposed in the field of the opposite side of the aforementioned pre-insulation layer assemblage side -- the state where a conductor and other conductors were made to counter -- these flats -- the 1st process which arranges a conductor and other conductors between the horn of an ultrasonic welding machine, and Annville between a horn and Annville -- the aforementioned flat -- by pinching a conductor and other conductors, the salient prepared in the aforementioned horn or the pressurization side of Annville is eaten into the aforementioned pre-insulation layer -- making -- the aforementioned flat -- the 2nd process contacted to a conductor and the aforementioned horn are vibrated -- making -- the aforementioned flat -- the 3rd process which welds other conductors to a conductor

[Claim 2] the flat which prepared the pre-insulation layer in one [at least] field characterized by providing the following -- the method of connecting a conductor to other conductors at the connection side side which is the field and the field of an opposite side in which the aforementioned pre-insulation layer was prepared the flat exposed in the aforementioned connection side -- the state where a conductor and other conductors were made to counter -- between the horn of an ultrasonic welding machine, and Annville -- the aforementioned pre-insulation layer -- minding -- the aforementioned flat -- the 1st process which pinches a conductor and other conductors the 1st process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- the 2nd process which removes a contact portion with the aforementioned horn or Annville in the aforementioned pre-insulation layer by making it vibrate in the direction of a field of a conductor, and the crossing direction between the horn of an ultrasonic welding machine, and Annville - - the aforementioned horn or Annville -- the removal portion of the aforementioned pre-insulation layer -- setting -- the aforementioned flat -- the state where the conductor was contacted -- the aforementioned flat -- the 3rd process which pinches a conductor and other conductors the 3rd process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- making it vibrate in the direction of a field of a conductor -- the aforementioned flat -- the 4th process which welds other conductors to a conductor

[Claim 3] the flat of a claim 2 -- the connection method of a conductor -- setting -- the above 1st and the 2nd process -- setting -- the aforementioned pre-insulation layer -- minding -- a flat -- the horn and Annville which pinch a conductor and other conductors -- the 3rd and 4th processes -- setting -- the direct aforementioned flat -- the flat characterized by serving both as the horn which welds a conductor and other conductors, and Annville -- the connection method of a conductor

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] the flat by which this invention is used for automatic in-the-car wiring or the wiring in an electrical machinery and apparatus -- it is related with the method of connecting a conductor to other conductors

[0002]

[Description of the Prior Art] the flat which plurality arranges in parallel -- since the flat cable called so-called flexible printed circuit which comes to prepare a pre-insulation layer in both sides or one side of a conductor can store much wiring in a few space, it is often recently used for the wiring in automatic in the car or an electrical machinery and apparatus

[0003] the flat of the above flat cables -- a conductor -- other flats -- the case where it connects with a conductor or the usual electric wire -- the former -- setting -- each flat -- this terminal section after connecting a terminal to the terminal section of a conductor individually or removing the pre-insulation layer of the terminal section of a flat cable -- a connector -- equipping -- the aforementioned terminal or a connector -- minding -- the aforementioned flat -- it was made to connect other conductors to a conductor

[0004] However, since it is common to have quite big thickness and width of face compared with a flat cable as for the above terminals and connectors, when such a terminal and a connector are used, a big space is needed for a connection and there is a problem that the advantage by using a flat cable [say / a ** space] cannot fully be employed efficiently.

[0005] for this reason, it is recently indicated by JP,62-105308,A -- as -- two or more flats -- making small the space which this connection occupies is proposed by carrying out the direct file of the conductor by ultrasonic welding the flat indicated here -- the connection method of a conductor -- ultrasonic welding -- a flat -- in order to connect a conductor -- the time of connection -- the aforementioned flat -- the insulating material which serves as a pre-insulation layer after it does not prepare a pre-insulation layer in the field where the horn of the connection side in a conductor and the field of an opposite side, i.e., an ultrasonic welding machine, or Annville contacts but connection finishes -- a flat -- it is made to stick on a conductor

[0006]

[Problem(s) to be Solved by the Invention] however, the flat indicated by the official report conventionally [above-mentioned] -- since the connection method of a conductor is what prepares a pre-insulation layer after connection by ultrasonic welding finishes -- a flat -- very complicated work called the alignment of a conductor and a pre-insulation layer had to be done, and there was a problem that working efficiency became low

[0007] in order to solve such a problem -- before connection -- a flat -- it is possible to remove beforehand only the pre-insulation layer of the part where the pre-insulation layer is prepared in the conductor, and the horn of an ultrasonic welding machine or Annville contacts However, by such method, there is a problem that it is difficult to carry out alignment of the removal part of a pre-

insulation layer, a horn, or Annville, and it is not based on practical use.

[0008] the flat which invention was made in view of the above situations, and prepared the pre-insulation layer in one [at least] field -- the flat which can connect a conductor to other conductors easily in the connection side which is the field and the field of an opposite side in which the aforementioned pre-insulation layer was prepared -- it aims at offering the connection method of a conductor

[0009]

[Means for Solving the Problem] the flat of the claim 1 which attains the above-mentioned purpose -- the connection method of a conductor the flat exposed in the field of the opposite side of the aforementioned pre-insulation layer assemblage side -- in the state where a conductor and other conductors were made to counter these flats -- between the 1st process which arranges a conductor and other conductors between the horn of an ultrasonic welding machine, and Annville, and horns and Annville -- the aforementioned flat -- by pinching a conductor and other conductors the salient prepared in the aforementioned horn or the pressurization side of Annville is eaten into the aforementioned pre-insulation layer -- making -- the aforementioned flat -- the 2nd process contacted to a conductor and the aforementioned horn are vibrated -- making -- the aforementioned flat -- it is characterized by including the 3rd process which welds other conductors to a conductor

[0010] moreover, the flat of a claim 2 -- the connection method of a conductor the flat exposed in the aforementioned connection side -- in the state where a conductor and other conductors were made to counter between the horn of an ultrasonic welding machine, and Annville -- the aforementioned pre-insulation layer -- minding -- the aforementioned flat -- with the 1st process which pinches a conductor and other conductors the 1st process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- by making it vibrate in the direction of a field of a conductor, and the crossing direction Between the 2nd process which removes a contact portion with the aforementioned horn or Annville in the aforementioned pre-insulation layer, the horn of an ultrasonic welding machine, and Annville the aforementioned horn or Annville -- the removal portion of the aforementioned pre-insulation layer -- setting -- the aforementioned flat, where a conductor is contacted the aforementioned flat -- the 3rd process which pinches a conductor and other conductors, and the 3rd process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- by making it vibrate in the direction of a field of a conductor the aforementioned flat -- it is characterized by including the 4th process which welds other conductors to a conductor

[0011] the flat of a claim 3 -- the connection method of a conductor -- a claim 2 -- setting -- the above 1st and the 2nd process -- setting -- the aforementioned pre-insulation layer -- minding -- a flat -- the horn and Annville which pinch a conductor and other conductors -- the 3rd and 4th processes -- setting -- the direct aforementioned flat -- it is characterized by serving both as the horn which welds a conductor and other conductors, and Annville

[0012]

[Function] the flat of a claim 1 -- the connection method of a conductor -- a flat -- even when the pre-insulation layer is beforehand prepared in the conductor, the salient prepared in the horn or the pressurization side of Annville eats into the aforementioned pre-insulation layer -- between a direct horn and Annville -- a flat -- a conductor and this flat -- other conductors linked to a conductor can be pinched therefore, the thing for which a horn is vibrated in this state -- the aforementioned flat -- a conductor and other conductors are connectable

[0013] the flat of a claim 2 -- the connection method of a conductor -- a flat -- the case where the pre-insulation layer is beforehand prepared in the conductor -- between a horn and Annville -- the aforementioned pre-insulation layer -- minding -- the aforementioned flat -- the state where a conductor and other conductors were pinched -- the aforementioned horn -- the aforementioned flat -- the aforementioned pre-insulation layer is removable by making it vibrate in the direction of a field of a conductor, and the crossing direction therefore, a degree -- between a horn and Annville -- a direct flat -- a conductor and other conductors -- pinching -- a horn -- the aforementioned flat -- making it vibrate in

the direction of a field of a conductor -- the aforementioned flat -- a conductor and other conductors can be welded

[0014] the flat of a claim 3 -- the connection method of a conductor -- a pre-insulation layer -- minding - the aforementioned flat -- having maintained the pinching state for the horn and Annville which pinched a conductor and other conductors -- a flat -- it can use as the horn which welds a conductor and other conductors, and Annville

[0015]

[Example] drawing 1 - drawing 5 -- the flat of the flat cables 10 and 20 of two sheets -- the flat by invention in the case of connecting conductors 11 and 21 -- the connection method of a conductor is shown

[0016] first, the flat of flat cables 10 and 20 -- the ultrasonic welding machine W which connects conductors 11 and 21 is explained, referring to drawing 6 and drawing 7 The three pillar-like pressurization sections P1 and A1 (at drawing 6 , the pressurization section P1 is un-illustrating) located at a triangular vertex, respectively are formed in the horn P of the ultrasonic welding machine W shown in drawing 6 , and Annville A. Each pressurization section P1 of Horn P is countered and formed in each pressurization section A1 of Annville A, respectively. Moreover, as shown in drawing 7 , the salients P11 or A11 of a large number prepared in the shape of a grid are formed in the pressurization side of each pillar-like pressurization sections P1 and A1. This ultrasonic welding machine W is equipped with the vibrator which vibrates Horn P horizontally.

[0017] Next, flat cables 10 and 20 are explained, referring to drawing 8 and drawing 9 .

[0018] two or more band-like flats in which the flat cable 10 was arranged in parallel as shown in drawing 8 -- it has the conductor 11 the aforementioned flat -- the circuit where a conductor 11 becomes by metallic foils, such as copper foil, -- it is a conductor and etching or press working of sheet metal is suitably formed of a means the aforementioned flat -- the insulating film 12 which becomes by polyester, the polyimide, etc. is stuck on one field of a conductor 11 using adhesives etc. two or more circular punching 13 forms in this insulating film 12 -- having -- **** -- these punching 13 -- minding -- the aforementioned flat -- the conductor 11 is exposed Punching 13 has a bigger area than the pressurization side of the pillar-like pressurization sections P1 and A1 of the aforementioned ultrasonic welding machine W. on the other hand -- the aforementioned flat -- the insulating film 14 which becomes with the same quality of the material as the aforementioned insulating film 12 is stuck on the field of another side of a conductor 11 using adhesives etc. this insulating film 14 -- the aforementioned flat -- the field of another side of a conductor 11 is continued and covered in the whole region

[0019] a flat cable 20 -- the aforementioned flat cable 10 -- the same -- a flat -- while the insulating film 22 with which punching 23 was formed in one field of a conductor 21 is stuck -- the aforementioned flat -- the insulating film 24 which covers the field of this another side covering the field of another side of a conductor 21 in the whole region is stuck Each punching 23 formed in the aforementioned insulating film 22 is formed in each punching 13 of a flat cable 10, and the position which counters by 1 to 1, when this flat cable 20 and the aforementioned flat cable 10 are confronted in the state of a rectangular cross, as shown in drawing 9 .

[0020] the flat of the aforementioned flat cable 10 -- the flat of a conductor 11 and a flat cable 20 -- in connecting a conductor 21, the aforementioned flat cable 10 and a flat cable 20 are first laid on the pressurization section A1 of aforementioned Annville A At this time, as shown in drawing 1 , the punching 13 formed in the insulating film 12 of a flat cable 10 and the punching 23 formed in the insulating film 22 of a flat cable 20 arrange so that it may counter in the position corresponding to the pressurization section A1 of aforementioned Annville A.

[0021] Next, as shown in drawing 2 , Horn P is dropped and the aforementioned flat cables 10 and 20 are pinched between the pressurization section P1 of this horn P, and the pressurization section A1 of aforementioned Annville A.

[0022] the salient A11 formed in the pressurization section A1 of Annville A as by dropping Horn P further from the state of drawing 2 showed to drawing 3 -- the insulating film 14 of a flat cable 10 -- eating away -- a flat -- the salient P11 which contacted the conductor 11 and was formed in the

pressurization side of the pressurization section P1 of Horn P -- the insulating film 24 of a flat cable 20 -
 - eating away -- a flat -- a conductor 21 is contacted moreover, a flat -- a conductor 11 and a flat -- a
 conductor 21 invades into punching 13 and punching 23, and it contacts mutually
 [0023] in the state of this drawing 3 , by vibrating the horn P of the ultrasonic welding machine W
 shows to drawing 4 -- as -- a flat -- a conductor 11 and a flat -- ultrasonic welding of the conductor 21 is
 carried out

[0024] above -- carrying out -- a flat -- a conductor 11 and a flat -- these flats after carrying out
 ultrasonic welding of the conductor 21 -- conductors 11 and 21 are removed from the aforementioned
 ultrasonic welding machine W At this time, the remains 15 and 25 of interlocking of the aforementioned
 salients A11 and P11 are formed in the insulating films 14 and 24. Therefore, in order to cover the
 remains 15 and 25 of interlocking, as shown in drawing 5 , insulating tapes 16 and 26 are stuck on the
 aforementioned insulating film 14 and 24. the attachment work of these insulating tapes 16 and 26 --
 insulating tapes 16 and 26 -- the above -- the flat after welding operation which was being
 conventionally performed since what is necessary was just to stick so that holes 15 and 25 may be
 covered -- compared with the attachment work of the insulating films 14 and 24 to a conductor 11 and
 21 top, it is far simple, and working efficiency is not reduced so much

[0025] the flat which formed the insulating film 12 in one field by making it above -- the flat which
 formed the insulating film 22 in one [a conductor 11 and] field -- a conductor 22 can be welded using
 the ultrasonic welding machine W

[0026] the above flats performed using the ultrasonic welding machine W as shown in drawing 6 -- the
 connection method of a conductor -- each flat of three or more flat cables -- when connecting a
 conductor, it can adopt namely, the state where the flat cable 130 was interposed between the
 aforementioned flat cables 110,120 as shown in drawing 10 -- the flat of a flat cable 110 -- the flat of a
 conductor 111 and a flat cable 130 -- the flat of a conductor 131 and a flat cable 120 -- these can be
 welded that a conductor 121 should be connected In this case, a flat cable 110,120 is almost the same as
 the aforementioned flat cables 10 and 20. namely, a flat -- punching 113 or 123 forms only in the
 insulating films 112 and 122 prepared in one field of a conductor 111,121 -- having -- **** -- a flat --
 the insulating films 114 and 124 prepared in the field of another side of conductors 111 and 121 have
 covered the whole field of this another side moreover, the insulating film 132,134 prepared in the field
 of the both sides of a flat cable 131 at the flat cable 130 -- respectively -- alike -- the aforementioned flat
 -- the punching 133,135 to which a conductor 131 is exposed is formed

[0027] the flat of the above flat cables 110,120,130 -- the welding pressure given to Horn P as a
 conductor 111,121,131 was shown in drawing 11 -- between this horn P and Annville A -- a flat -- while
 contacting a conductor 111,121,131, the salients P11 and A11 formed in the pressurization side of the
 pressurization sections P1 and A1 are eaten into the insulating film 114,124, respectively -- making -- a
 flat -- ultrasonic welding can be carried out by making a conductor 111,121 contact and subsequently
 vibrating Horn P

[0028] moreover, the flat of the flat cable 210 as shows the connection method of the above-mentioned
 flat cable to drawing 12 -- the flat of a conductor 211 and a flat cable 220 -- it is applicable also to
 connection of a conductor 221

[0029] a flat cable 210 -- a flat -- it is what formed the insulating film 212,214 in both sides of a
 conductor 211, and in the point of this flat cable 210, the insulating film 212 of one field is cut in
 predetermined length, and is lacked -- having -- **** -- this notch 213 -- setting -- a flat -- the conductor
 211 is exposed moreover, the flat cable 220 -- a flat -- it is what formed the insulating film 222,224 in
 both sides of a conductor 221, and in the point of this flat cable 220, the insulating film 222 of one field
 cuts in predetermined length, and lacks -- having -- **** -- this notch 223 -- setting -- a flat -- the
 conductor 221 is exposed

[0030] In carrying out ultrasonic welding of the above flat cables 210,220, as shown in drawing 13 , it
 arranges these flat cables 210,220 between the aforementioned horn P and Annville A in the state where
 the notch 213 of the insulating film 212 and the notch 223 of the insulating film 222 were made to
 counter. Subsequently, as shown in drawing 14 , a pressure is applied to the aforementioned flat cable

210,220 between Horn P and Annville A. this -- the salient P11 of the pressurization section P1 -- the insulating film 224 -- eating away -- a flat -- a conductor 221 is contacted -- both -- the salient A11 of the pressurization section A1 -- the insulating film 214 -- eating -- a **** flat -- a conductor 211 is contacted therefore, the thing for which Horn P is vibrated in this state -- a flat -- a conductor 211 and a flat -- a conductor 221 can be welded

[0031] the above flats -- the connection method of a conductor is shown in drawing 15 and drawing 16 - - as -- the flat of a flat cable 10 -- the flat of a conductor 11 or a flat cable 210 -- when welding the conductor E1 of an electric wire E to a conductor 211, it can adopt

[0032] drawing 15 and drawing 16 -- like -- a flat -- the procedure in the case of connecting a conductor E1 to a conductor 11,211 -- a flat -- it explains, referring to drawing 17 which shows one process in the case of connecting a conductor E1 to a conductor 11

[0033] First, a flat cable 10 is laid on Annville A in the state where the notch 13 was made to correspond to the pressurization section A1, and an electric wire E is arranged so that a conductor E1 may be contacted to the aforementioned notch 13 of this flat cable 10. Subsequently, horn P' is dropped and a pressure is applied to this horn P', the flat cable 10 pinched between Annville A, and a conductor E1. the salient A11 formed in the pressurization side of the pressurization section A1 of Annville A of this -- the insulating film 14 of a flat cable 10 -- eating away -- a flat -- a conductor 11 is contacted therefore, the thing for which Horn P is vibrated in this state -- a flat -- ultrasonic welding of a conductor 11 and the conductor E1 can be carried out thus, the flat of a flat cable 10 -- a conductor -- the salient does not need to be formed in the pressurization side of the pressurization section P'1 of horn P' when welding the conductor E1 of an electric wire E to the 11th grade

[0034] it is shown in drawing 15 and drawing 16 -- as -- a flat -- a conductor -- the case where a conductor E1 is connected to the 11th grade -- previous statement -- like -- the Annville side -- a flat -- although it is more desirable on work to arrange a conductor 11 and to arrange an electric wire E to a horn side -- a horn side -- a flat -- a conductor -- even if it arranges the 211st grade and arranges an electric wire E to the Annville side, it does not interfere

[0035] drawing 18 - drawing 22 -- the flat of the aforementioned flat cables 10 and 20 -- other flats which connect conductors 11 and 21 -- the connection method of a conductor is shown

[0036] the flat shown here -- the ultrasonic welding machine W which also shows the connection method of a conductor to drawing 6, and the almost same ultrasonic welding machine -- it carries out using W " The appearance of W " of this ultrasonic welding opportunity is almost equal to the appearance of the aforementioned ultrasonic welding machine W. However, W " of ultrasonic welding opportunities used here is equipped with the 1st vibrator which vibrates horn P" perpendicularly, and the 2nd vibrator which vibrates horn P" horizontally. moreover -- a horn -- P -- " -- pressurization -- the section -- P -- one -- " -- pressurization -- a field -- and -- Annville -- A -- " -- pressurization -- the section -- A -- one -- " -- pressurization -- a field -- both -- flat -- drawing 6 -- being shown -- ultrasonic welding -- a machine -- W -- like -- a salient -- P -- 11 -- A -- 11 -- having -- **** .

[0037] [in case conductors 11 and 21 are connected] the above ultrasonic welding machines -- W " -- using -- the flat of the aforementioned flat cables 10 and 20 -- first -- drawing 18 -- being shown -- as -- punching -- 13 -- punching -- 23 -- countering -- making -- and -- these -- punching -- 13 -- 23 -- a horn - - P -- " -- pressurization -- the section -- P -- one -- " -- Annville -- A -- " -- pressurization -- the section - - A -- one -- " -- corresponding -- having made -- a state -- The aforementioned flat cable 10 and a flat cable 20 are laid on aforementioned Annville A" pressurization section A1".

[0038] next, by dropping the aforementioned horn P" shows to drawing 19 -- as -- pressurization section P1" and A1" -- flat cables 10 and 20 -- a pressure -- adding -- a flat -- conductors 11 and 21 are contacted

[0039] Next, horn P" is vibrated in the state of drawing 19 in the perpendicular direction of a field, i.e., the direction of flat cables 10 and 20, and the crossing direction. As shown in drawing 20, the insulating films 12 and 22 in contact with the aforementioned pressurization section P1" and A1" are removed by this, and punching 15 and 25 carries out opening by it. moreover, each pressurization side (the aforementioned pressurization section P1" and A1") -- respectively -- a flat -- conductors 11 and 21 are

contacted

[0040] therefore, this state -- the aforementioned ultrasonic welding machine -- by making it vibrate horizontally shows W-" horn P" to drawing 21 -- as -- a flat -- ultrasonic welding of the conductors 11 and 21 can be carried out

[0041] Finally, as shown in drawing 22 , insulating tapes 16 and 26 are stuck on the aforementioned insulating film 12 and 22 to -ed ** the aforementioned punching 15 and 25 which carried out opening to the contact section (the aforementioned pressurization section P1" and A1").

[0042] as mentioned above, the flat shown in drawing 18 - drawing 22 -- the connection method of a conductor -- a flat -- a conductor 11 or a flat -- the state where the insulating films 14 and 24 were formed in one field (a welding side and field of an opposite side) of a conductor 21 -- these flats -- conductors 11 and 21 -- an ultrasonic welding machine -- it can weld using W "

[0043] in addition, the ultrasonic welding machine equipped with the vibrator which vibrates horn P" perpendicularly, and the vibrator which makes it vibrate horizontally in the example shown in above-mentioned drawing 18 - drawing 22 , although the case where it carried out using W " was shown The process of drawing 18 - drawing 20 is performed using an ultrasonic welding machine equipped with the vibrator which vibrates a horn perpendicularly, and it may be made to perform the process of drawing 21 - drawing 22 with the ultrasonic welding machine subsequently equipped with the vibrator which vibrates a horn horizontally.

[0044] moreover, the flat shown in above-mentioned drawing 18 - drawing 22 -- Annville AB located in the side (anvil AA" located in a horn P" lower part, and the aforementioned horn P") as the connection method of a conductor is shown in drawing 23 -- " -- having -- and either -- you may carry out only in the one direction using the ultrasonic welding machine which has one vibrator which vibrates horn P" For example, the insulating films 12 and 22 are removed by vibrating horn P", where flat cables 10 and 20 are first pinched between horn P" and Annville AB", when it has the vibrator which vibrates horn P" horizontally. subsequently, the flat contacted between horn P" and anvil AA" -- vibrating horn P", where conductors 11 and 21 are pinched -- the aforementioned flat -- you may be made to carry out ultrasonic welding of the conductors 11 and 21

[0045] furthermore, the flat shown in above-mentioned drawing 18 - drawing 22 -- the flat which shows the connection method of a conductor to aforementioned drawing 1 - drawing 5 -- the flat of three or more flat cables 110,120,130 as shown in drawing 10 like the connection method of a conductor -- when connecting a conductor 111,121,131, it can apply moreover, the flat for which the point of the insulating film 212 of one field was cut, and was lacked and exposed as shown in drawing 12 -- the flat for which the conductor 211 and the point of the insulating film 222 of one field were cut, and were lacked and exposed -- when connecting a conductor 221, it can apply furthermore, it is shown in drawing 15 or drawing 16 -- as -- a flat -- when connecting a conductor 211 and the conductor E1 of an electric wire E, it can apply

[0046] in addition, the flat explained with reference to aforementioned drawing 1 - drawing 5 -- the flat explained with reference to the connection method of a conductor and drawing 18 - drawing 22 -- each connection method of a conductor is shown in drawing 8 or drawing 12 -- as -- a flat -- the flat exposed by preparing the insulating films 12 and 14 or 212,214 in both sides of a conductor 11,211, and removing some insulating films 12,212 of one field -- it is made to weld other conductors to a conductor 11,211 however, the flat set as the object of the describing [above] all directions method -- the flat of the flat cable 310 which shows a conductor to drawing 24 -- like a conductor 311, it is a non-welding field -- on the other hand, the flat which forms the insulating film 312 only in a field side, and has not prepared the insulating film in the field of another side used as a welding side -- you may be a conductor

[0047]

[Effect of the Invention] according to a claim 1 and a claim 2 -- a flat -- the state where while became the non-welding field of a conductor and the pre-insulation layer was prepared in the field -- a flat -- welding of a conductor and other conductors can be performed using an ultrasonic welding machine Therefore, it is not necessary to do the attachment work of the difficult pre-insulation layer of alignment,

and the effect that the efficiency of welding operation can be raised is done so in welding operation. [0048] according to a claim 3 -- a pre-insulation layer -- removing -- a flat -- the process at which a conductor is exposed, and a flat -- between the processes which carry out ultrasonic welding of a conductor and other conductors -- a flat -- the process which replaces the position of a conductor and other conductors with is not needed, therefore working efficiency improves more

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TECHNICAL FIELD

[Industrial Application] the flat by which this invention is used for automatic in-the-car wiring or the wiring in an electrical machinery and apparatus -- it is related with the method of connecting a conductor to other conductors

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 PRIOR ART

[Description of the Prior Art] the flat which plurality arranges in parallel -- since the flat cable called so-called flexible printed circuit which comes to prepare a pre-insulation layer in both sides or one side of a conductor can store much wiring in a few space, it is often recently used for the wiring in automatic in the car or an electrical machinery and apparatus

[0003] the flat of the above flat cables -- a conductor -- other flats -- the case where it connects with a conductor or the usual electric wire -- the former -- setting -- each flat -- this terminal section after connecting a terminal to the terminal section of a conductor individually or removing the pre-insulation layer of the terminal section of a flat cable -- a connector -- equipping -- the aforementioned terminal or a connector -- minding -- the aforementioned flat -- it was made to connect other conductors to a conductor

[0004] However, since it is common to have quite big thickness and width of face compared with a flat cable as for the above terminals and connectors, when such a terminal and a connector are used, a big space is needed for a connection and there is a problem that the advantage by using a flat cable [say / a ** space] cannot fully be employed efficiently.

[0005] for this reason, it is recently indicated by JP,62-105308,A -- as -- two or more flats -- making small the space which this connection occupies is proposed by carrying out the direct file of the conductor by ultrasonic welding the flat indicated here -- the connection method of a conductor -- ultrasonic welding -- a flat -- in order to connect a conductor -- the time of connection -- the aforementioned flat -- the insulating material which serves as a pre-insulation layer after it does not prepare a pre-insulation layer in the field where the horn of the connection side in a conductor and the field of an opposite side, i.e., an ultrasonic welding machine, or Annville contacts but connection finishes -- a flat -- it is made to stick on a conductor

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EFFECT OF THE INVENTION

[Effect of the Invention] according to a claim 1 and a claim 2 -- a flat -- the state where while became the non-welding field of a conductor and the pre-insulation layer was prepared in the field -- a flat -- welding of a conductor and other conductors can be performed using an ultrasonic welding machine. Therefore, it is not necessary to do the attachment work of the difficult pre-insulation layer of alignment, and the effect that the efficiency of welding operation can be raised is done so in welding operation. [0048] according to a claim 3 -- a pre-insulation layer -- removing -- a flat -- the process at which a conductor is exposed, and a flat -- between the processes which carry out ultrasonic welding of a conductor and other conductors -- a flat -- the process which replaces the position of a conductor and other conductors with is not needed, therefore working efficiency improves more

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 TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, the flat indicated by the official report conventionally [above-mentioned] -- since the connection method of a conductor is what prepares a pre-insulation layer after connection by ultrasonic welding finishes -- a flat -- very complicated work called the alignment of a conductor and a pre-insulation layer had to be done, and there was a problem that working efficiency became low

[0007] in order to solve such a problem -- before connection -- a flat -- it is possible to remove beforehand only the pre-insulation layer of the part where the pre-insulation layer is prepared in the conductor, and the horn of an ultrasonic welding machine or Annville contacts. However, by such method, there is a problem that it is difficult to carry out alignment of the removal part of a pre-insulation layer, a horn, or Annville, and it is not based on practical use.

[0008] the flat which invention was made in view of the above situations, and prepared the pre-insulation layer in one [at least] field -- the flat which can connect a conductor to other conductors easily in the connection side which is the field and the field of an opposite side in which the aforementioned pre-insulation layer was prepared -- it aims at offering the connection method of a conductor

[Translation done.]

* NOTICES *

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MEANS

[Means for Solving the Problem] claim 1 this invention which attains the above-mentioned purpose -- a flat -- it is characterized by providing the following in the connection method of a conductor the flat exposed in the field of the opposite side of the aforementioned pre-insulation layer assemblage side -- the state where a conductor and other conductors were made to counter -- these flats -- the 1st process which arranges a conductor and other conductors between the horn of an ultrasonic welding machine, and Annville between a horn and Annville -- the aforementioned flat -- by pinching a conductor and other conductors, the salient prepared in the aforementioned horn or the pressurization side of Annville is eaten into the aforementioned pre-insulation layer -- making -- the aforementioned flat -- the 2nd process contacted to a conductor the aforementioned horn is vibrated -- making -- the aforementioned flat -- the 3rd process which welds other conductors to a conductor

[0010] moreover, claim 2 this invention -- a flat -- it is characterized by providing the following in the connection method of a conductor the flat exposed in the aforementioned connection side -- the state where a conductor and other conductors were made to counter -- between the horn of an ultrasonic welding machine, and Annville -- the aforementioned pre-insulation layer -- minding -- the aforementioned flat -- the 1st process which pinches a conductor and other conductors the 1st process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- the 2nd process which removes a contact portion with the aforementioned horn or Annville in the aforementioned pre-insulation layer by making it vibrate in the direction of a field of a conductor, and the crossing direction between the horn of an ultrasonic welding machine, and Annville -- the aforementioned horn or Annville -- the removal portion of the aforementioned pre-insulation layer -- setting -- the aforementioned flat -- the state where the conductor was contacted -- the aforementioned flat -- the 3rd process which pinches a conductor and other conductors the 3rd process of the above -- setting -- the aforementioned flat -- the horn which is pinching a conductor and other conductors -- the aforementioned flat -- making it vibrate in the direction of a field of a conductor -- the aforementioned flat -- the 4th process which welds other conductors to a conductor

[0011] the flat of a claim 3 -- the connection method of a conductor -- a claim 2 -- setting -- the above 1st and the 2nd process -- setting -- the aforementioned pre-insulation layer -- minding -- a flat -- the horn and Annville which pinch a conductor and other conductors -- the 3rd and 4th processes -- setting -- the direct aforementioned flat -- it is characterized by serving both as the horn which welds a conductor and other conductors, and Annville

[Translation done.]

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 OPERATION

[Function] the flat of a claim 1 -- the connection method of a conductor -- a flat -- even when the pre-insulation layer is beforehand prepared in the conductor, the salient prepared in the horn or the pressurization side of Annville eats into the aforementioned pre-insulation layer -- between a direct horn and Annville -- a flat -- a conductor and this flat -- other conductors linked to a conductor can be pinched therefore, the thing for which a horn is vibrated in this state -- the aforementioned flat -- a conductor and other conductors are connectable

[0013] the flat of a claim 2 -- the connection method of a conductor -- a flat -- the case where the pre-insulation layer is beforehand prepared in the conductor -- between a horn and Annville -- the aforementioned pre-insulation layer -- minding -- the aforementioned flat -- the state where a conductor and other conductors were pinched -- the aforementioned horn -- the aforementioned flat -- the aforementioned pre-insulation layer is removable by making it vibrate in the direction of a field of a conductor, and the crossing direction therefore, a degree -- between a horn and Annville -- a direct flat -- a conductor and other conductors -- pinching -- a horn -- the aforementioned flat -- making it vibrate in the direction of a field of a conductor -- the aforementioned flat -- a conductor and other conductors can be welded

[0014] the flat of a claim 3 -- the connection method of a conductor -- a pre-insulation layer -- minding - - the aforementioned flat -- having maintained the pinching state for the horn and Annville which pinched a conductor and other conductors -- a flat -- it can use as the horn which welds a conductor and other conductors, and Annville

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] the flat by invention -- the connection method of a conductor -- setting -- between a horn and Annville -- two flats -- it is explanatory drawing showing the state where the conductor has been arranged

[Drawing 2] the same -- a horn and Annville -- two flats -- it is explanatory drawing showing the state where the conductor was pinched

[Drawing 3] the same -- each flat -- it is explanatory drawing showing the state where the salient ate away on the insulating film by the side of the non-welding field of a conductor

[Drawing 4] the same -- each flat -- it is explanatory drawing showing the state where the conductor was welded

[Drawing 5] the same -- each flat -- it is explanatory drawing showing the state where the insulating tape was stuck on the insulating film by the side of the non-welding field of a conductor

[Drawing 6] It is the outline block diagram of an ultrasonic welding machine.

[Drawing 7] It is drawing showing a horn and the pressurization section of Annville.

[Drawing 8] a flat -- it is tropia explanatory drawing showing a conductor

[Drawing 9] two flats welded by the method of invention -- it is explanatory drawing showing the physical relationship of a conductor

[Drawing 10] three flats welded by the method of invention -- it is explanatory drawing showing the physical relationship of a conductor

[Drawing 11] three flats shown in drawing 10 -- it is cross-section explanatory drawing showing the state where the conductor was welded

[Drawing 12] other two flats welded by the method of invention -- it is explanatory drawing showing a conductor

[Drawing 13] two flats shown in drawing 12 -- it is explanatory drawing showing the state where the conductor has been arranged between a horn and Annville

[Drawing 14] two flats shown in drawing 12 -- it is explanatory drawing showing the state where the conductor was compressed by the horn and Annville

[Drawing 15] the flat welded with the conductor of an electric wire by the method of invention -- it is tropia explanatory drawing showing a conductor

[Drawing 16] other flats welded with the conductor of an electric wire by the method of invention -- it is tropia explanatory drawing showing a conductor

[Drawing 17] a flat -- it is explanatory drawing showing one process in the case of connecting a conductor to the conductor of an electric wire

[Drawing 18] the flat by other invention -- the connection method of a conductor -- setting -- between a horn and Annville -- two flats -- it is explanatory drawing showing the state where the conductor has been arranged

[Drawing 19] the same -- a horn and Annville -- two flats -- it is explanatory drawing showing the state where the conductor was pinched

[Drawing 20] vibrating a horn perpendicularly similarly -- each flat -- it is explanatory drawing showing the state where the insulating film by the side of the non-welding field of a conductor was removed

[Drawing 21] vibrating a horn horizontally similarly -- two flats -- it is explanatory drawing showing the state where the conductor was welded

[Drawing 22] each flat -- it is explanatory drawing showing the state where the insulating tape was stuck on the insulating film by the side of the non-welding field of a conductor

[Drawing 23] It is the outline block diagram showing the modification of the ultrasonic welding machine which carries out other invention.

[Drawing 24] a flat -- it is the perspective diagram showing the modification of a conductor

[Description of Notations]

11,111,211 a flat -- conductor

12,112,212 Insulating film

21,122,222 a flat -- conductor

22,122,222 Insulating film

E1 Conductor (others -- a conductor)

W, W" Ultrasonic welding machine

P, P', P" Horn

A, A', A ", AA", AB" Annville

P1, A1 Salient

[Translation done.]

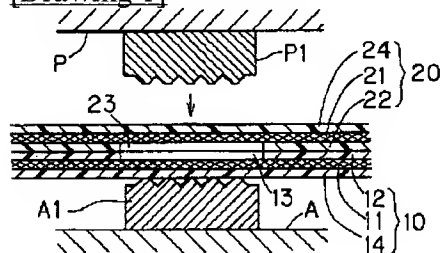
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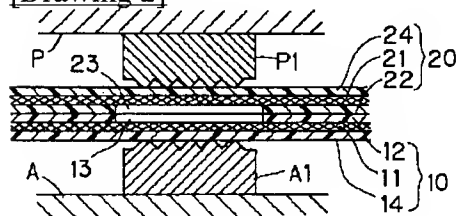
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DRAWINGS

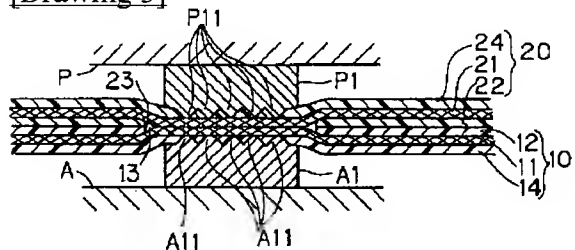
[Drawing 1]



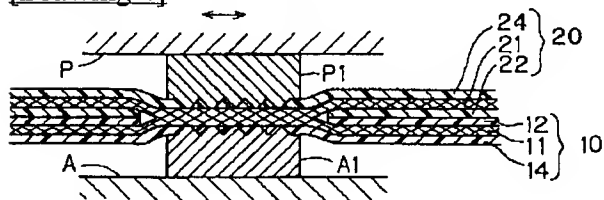
[Drawing 2]



[Drawing 3]



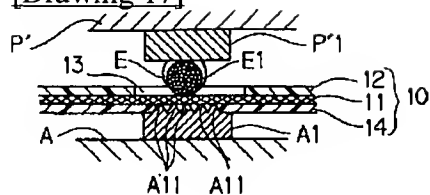
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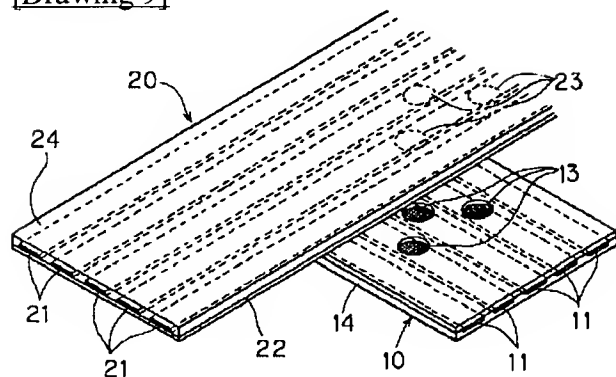
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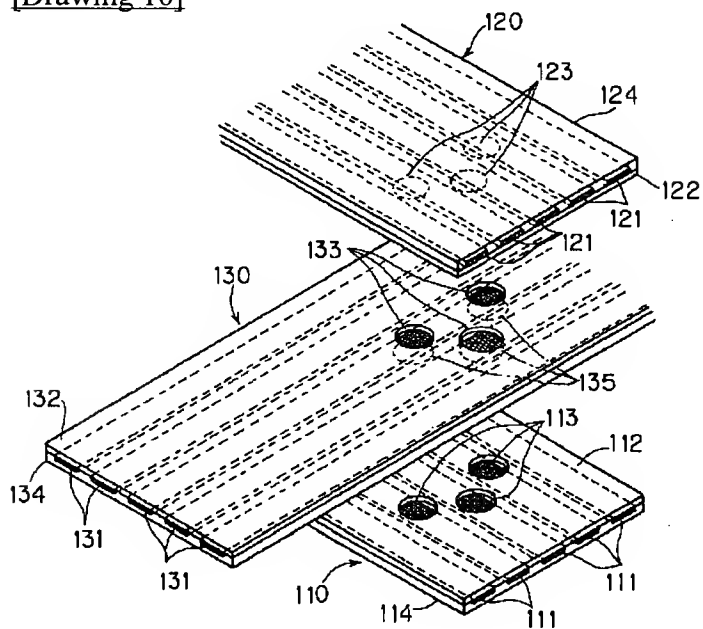
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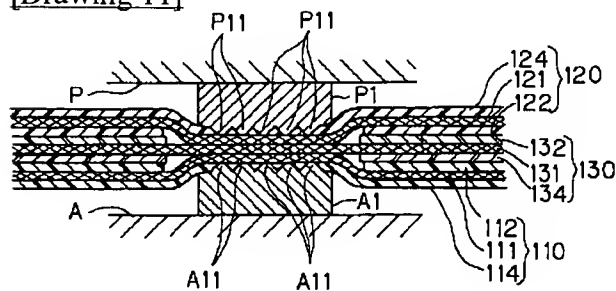
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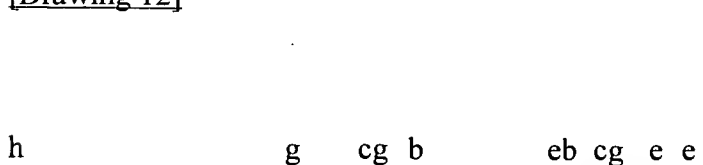
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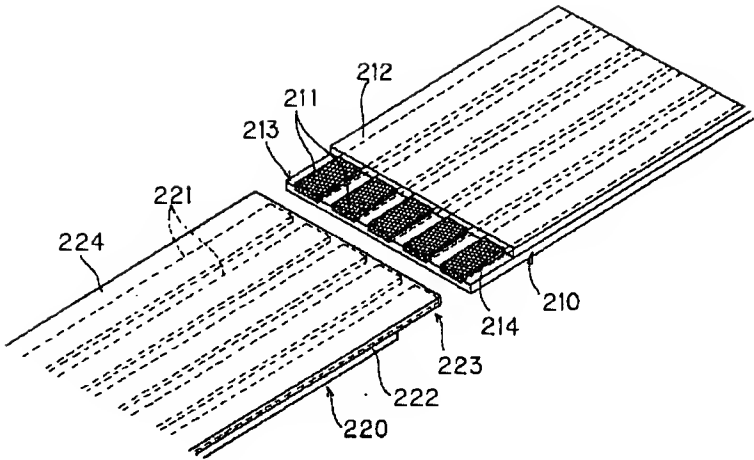


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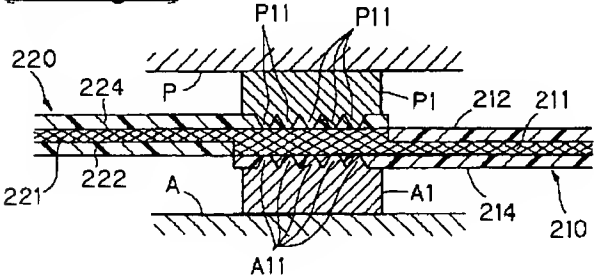


[Drawing 12]

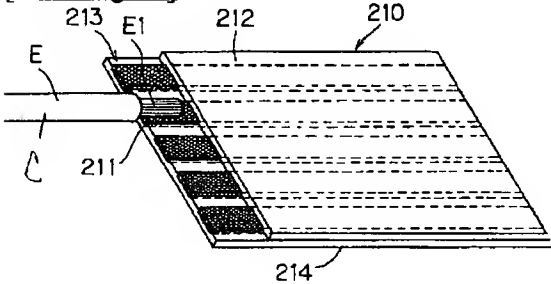




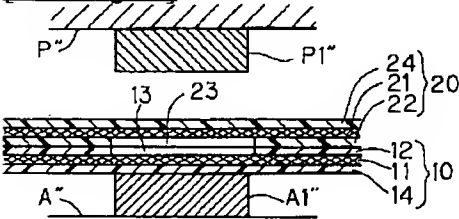
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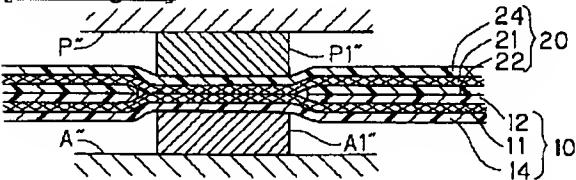
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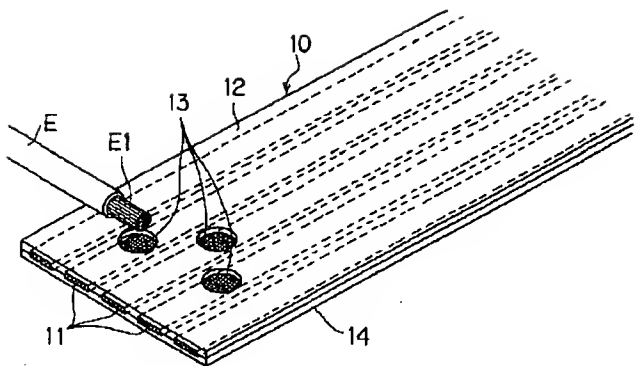
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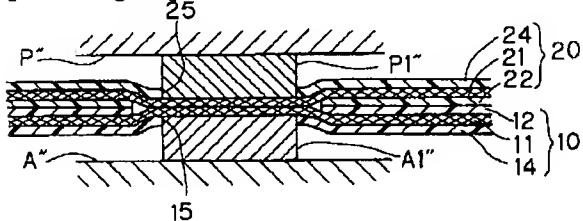
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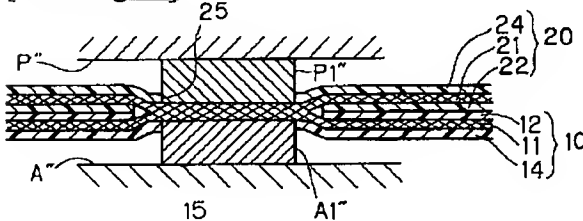
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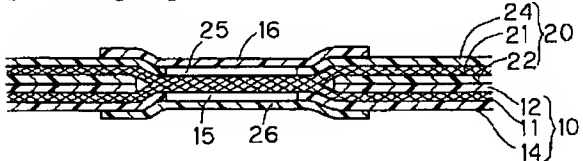
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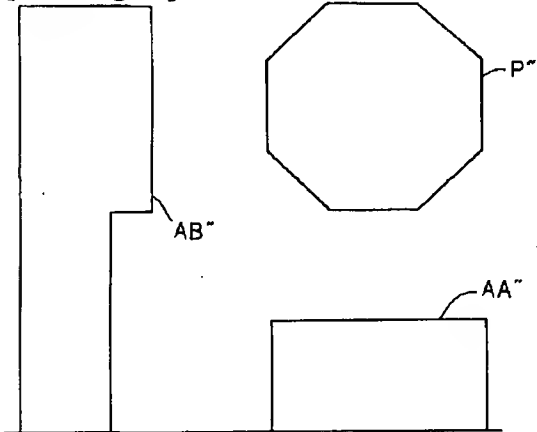
[Drawing 21]



[Drawing 22]



[Drawing 23]



[Drawing 24]